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⑯ Kerb-climbing device for a wheeled vehicle.

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⑯ Proprietor: CARTERS (J&A) LIMITED  
Alfred Street  
Westbury Wiltshire (GB)

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⑯ Inventor: Parker, Henry Noel  
5 Clos-Y-Bryn Rhiwbina  
Cardiff Wales (GB)

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⑯ Representative: Burrows, Anthony Gregory  
et al  
Haseltine Lake & Co. Hazlitt House 28  
Southampton Buildings Chancery Lane  
London, WC2 1AT (GB)

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FR-A-2 373 428  
US-A-2 612 379  
US-A-3 239 872  
US-A-3 722 638

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### Description

This invention relates to a wheeled vehicle and an attachment therefor. The invention is particularly concerned with kerb-climbing devices of wheelchairs.

GB-A-1 569 166 discloses a powered wheelchair with two large-diameter rear driven wheels and two small-diameter front castor wheels. Mounted on the wheelchair frame at respective locations above the castor wheels are two footrests turnable about respective vertical axes, and also two kerb-climbing devices including respective struts turnable about a horizontal axis. Each kerb-climbing device is fixed to the frame by fixing means including a bolt and a wing nut. Each strut includes an arcuate rocker end which contacts the kerb to be climbed. Acting between the wheelchair frame and the strut is a return spring.

Each strut is turnable rearwards from a ready position in which it extends downwards and forwards, against the action of the spring. In one version disclosed, when the spring returns the strut to its ready position, an arm of the kerb-climbing device strikes a locking plunger mounted on the wheelchair frame. Each plunger can be withdrawn manually by a knurled pin against the action of a spring, to allow the strut to be swung rearwards, against the action of its return spring, past the plunger, and then the plunger is released to detain the strut in an idle position in which it extends rearwards and upwards. Each arm is pivotally mounted at one end on its strut and at the other end is urged against a stop by a spring, so that, if an abnormal force urges the arm against its plunger, for example when the wheelchair is descending a kerb backwards, the spring yields whilst the arm remains in contact with its plunger, and no damage is done. In another version disclosed, each strut return spring is housed in a cylinder which is turnably mounted on the wheelchair frame and through which extends a rod encircled by the spring and articulated to the strut. In the ready position of the strut, a circlip on the rod abuts against an annular disc supported by the strut return spring. To bring the strut into an idle position in which it extends upwards and rearwards it is swung forwards and over its pivot, to carry it through a dead-centre position of the cylinder and the rod into the idle position, in which the circlip again abuts against the annular disc. In a third version, each strut return spring is a prestressed helical torsion spring the ends of which, in the ready position, press on opposite edges of projections fixed to walls of an assembly. To bring the strut to an idle position, a reciprocable pin is manually disengaged to release the assembly for turning relative to the wheelchair frame, and after turning of the strut and the assembly, the assembly is then re-connected to the frame by engagement of the pin.

Such kerb-climbing devices have various disadvantages. Firstly, the striking of the strut abutments against the frame abutments on return to

the ready positions produces jolts and noise which can be distressing and embarrassing for the patient in the wheelchair. Secondly, compared to the conventional, simple arrangements permitting easy detachment of footrests or leg-rests from wheelchair frames, the bolt-and wing-nut-arrangements make detachment of the kerb-climbing devices from the frame difficult, particularly for the patient in the wheelchair. Thirdly, in moving the strut from its ready position to its idle position, either some detent, i.e. the plunger or the pin, has to be disengaged beforehand, which can be awkward particularly for the patient in the wheelchair, or circlips and discs come to abut each other, thereby creating jolts and noise.

US-A-2,612,379 discloses attachments which can be applied to a vehicle such as a hand truck and which enable the truck to be drawn smoothly over a flight of steps. The attachments each include a sectorial strut pivotally mounted on the frame of the truck and having an arcuate rocker end which contacts the edge of the step. Connected between the strut and the frame are a piston-and-cylinder device of which the piston is interposed between two helical springs for maintaining the strut in its ready position. The piston-and-cylinder device has substantially no damping effect. This attachment has a number of disadvantages which make it unsuitable particularly for use on an invalid carriage. Firstly, the actual position of the strut in its ready condition is liable to vary considerably, since the springs allow the strut to swing to-and-fro, which is most likely to occur if the truck is being roughly handled over rough ground, with the result that the arcuate rocker end misses the step edge and the vehicle runs hard up against the step. Secondly, the attachments are not readily detachable from the vehicle.

There is known from DE-A-2 922 963 a double-acting shock-absorbing device for sliding doors and the like, comprised of a cylinder containing, near respective ends of the cylinder, two pistons with one or two compression springs between them. Through the pistons extend respective piston rods which not only project axially outwardly from the housing for connection to sliding door parts, but also project axially inwardly from the pistons and are there hollow for enabling a damping fluid contained in the cylinder to flow to the spaces between the pistons and their adjacent cylinder ends. Fixed co-axially in the hollow inner end of one of the piston rods is a piece of tube extending towards the other piston rod. As the pistons are moved towards each other from their outer end positions, this tube piece approaches the hollow inner end of the other piston rod and then begins to penetrate it. Since the latter hollow inner end narrows conically axially outwardly, the free gap between the tube piece and the hollow inner end continuously decreases. This arrangement gives a progressively greater damping effect by the damping fluid. In the rest condition of this shock-absorbing device, the pistons lie against shoulders on the inside of the cylinder.

This shock-absorbing device is unsuitable for use in obstruction-climbing devices of vehicles, because the pistons lie against abutments in the rest condition and there is no significant damping effect in the rest condition.

According to a first aspect of the present invention, there is provided a wheeled vehicle, at least one wheel of which has associated therewith a device for facilitating negotiation by said wheel of a kerb or similar obstruction, said device comprising a strut mounted on the vehicle for turning about a horizontal axis higher than the axis of the wheel, characterised in that said device comprises a liquid damping means arranged to damp said turning movement in a ready position of said strut.

An advantage of this vehicle is that the strut can be reliably maintained in a relatively unvarying ready position, without the return of the strut to its ready position producing any substantial jolting or noise.

According to a second aspect of the present invention, there is provided an attachment for detachably mounting on a frame of a wheeled vehicle, said attachment comprising a rest for a foot or a leg of an occupant of the vehicle, characterised in that said attachment also comprises a device for association with a wheel of said vehicle for facilitating negotiation by said wheel of a kerb or similar obstruction, said device comprising a strut mounted for turning about an axis which is horizontal when said attachment is mounted on said frame of said wheeled vehicle, and liquid damping means arranged to damp the turning movement of said strut.

Such combining together of an obstruction-climbing device and a foot-or leg-rest enables the combined attachment to be readily removable as a single unit from the vehicle.

In order that the invention may be clearly understood and readily carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:-

Figure 1 shows a side view of an occupied, motorized wheelchair climbing a kerb-like obstruction,

Figure 2 shows a side elevation of an attachment of the wheelchair, the attachment including an obstruction-climbing device which is shown in full lines in a ready position and in dot-dash lines in an idle position,

Figure 3 shows a front elevation of the attachment, with the obstruction-climbing device in its ready position, and

Figure 4 shows an axial sectional view through a piston-and-cylinder device of the obstruction-climbing device.

Referring to the drawings, the wheelchair 1 has two large-diameter rear wheels (of which one is seen and referenced 2) reversibly driven by respective electric motors (of which one is seen and referenced 3). The wheelchair 1 also includes two small-diameter, castor, front wheels 4, the wheels 2 and 4 being mounted on a transversely collapsible frame of the wheelchair. At its front,

the frame of the wheelchair includes two uprights (of which one is seen and referenced 6), on which respective attachments 7 are so mounted as to be swingable about the uprights from the forwardly projecting positions shown in Figure 1 outwardly into positions in which they are detachable from the uprights.

Each attachment 7 comprises a footrest 8 and an obstruction-climbing device 9 mounted on the footrest 8. Thereby the footrest 8 and the device 9 can be removed as a unit from the wheelchair frame to facilitate replacement temporarily by a conventional footrest unit where necessary to reduce the wheelchair width for passing through doorways, for example, or where kerb-climbing ability is not required. In a conventional manner, the footrest 8 includes two horizontal plates 10 by way of which it is mounted on two vertical pivot pins fixed to the upright 6. The plates 10 are fixed to a tubular bracket 11, a forwardly projecting part 12 of which pivotally supports a foot pad 13. Fixed to and projecting laterally outwards from the part 12 is a horizontal pivot pin 14 on which is pivotally mounted the lower end of a cylinder 15 of a piston-and-cylinder device 15, 16 of the device 9. Fixed to the upper part of the bracket 11 is a horizontal axle 17 on which a sectorial strut 18 is pivotally mounted. The strut 18 includes an arcuate obstruction-contacting part 19. The piston 16 includes a piston rod 20 the upper end zone 21 of which is in the shape of a hook and terminates on the axis A of the device 15, 16. At this terminal end it is horizontally articulated to a horizontal bush 32 of the strut 18 by way of a horizontal nut-and-bolt device 33. The cylinder 15 is oil-filled and sealed in a liquid-tight manner at each end. At its upper end, it is sealed by a stopper 22 which sealingly encircles the piston rod 20. The stopper 22 includes a bush 23 formed with an axially downwardly facing frusto-conical bearing surface 24 which bears an upper end of a helical compression spring 25 encircling the piston rod 20. The lower end zone of the piston rod 20 is formed with external screwthreading 26 on which is screwed an internally threaded bush 27 formed with an axially upwardly facing frusto-conical bearing surface 28 which bears the lower end of the spring 25. Two nuts 29 are screwed onto the lower end of the piston rod 20 and clamp a washer 30 between them. Between the washer 30 and the inner cylindrical wall of the cylinder 15 is a clearance through which the oil in the cylinder can be forced to flow.

The method of use of the obstruction-climbing device 9 is as follows:-

The strut 18 normally occupies its ready position shown in Figure 2, in which it is maintained by the clockwise moment produced by its own weight being opposed by the anti-clockwise moment produced by the spring 25. The damping provided by the oil in the cylinder 15 substantially prevents any undesired oscillatory movement of the ready strut 18 during travel of the wheelchair. During such travel, the castor wheels 4 themselves cope with any small obstructions on the

ground or floor, such as those which are about 2 1/2 cm (1") or 5cm. (2") high. However, any obstructions above that general height and up to about 12 1/2 cm. (5") high are encountered by and negotiated with the aid of the device 9. As the wheelchair advances towards the obstruction 31, the obstruction-contacting parts 19 come to bear against the obstruction. The continued operation of the motors of the wheelchair and thus the continued driving of its rear wheels causes each strut 18 to rock upon the obstruction while the wheelchair advances against the action of the spring 25 and against the damping action of the oil in the cylinder 15, so lifting the front of the wheelchair (through for example the condition shown in Figure 1), until the wheels 4 ride up onto the obstruction 31. Thereupon, each strut 18 is swung back into its ready position shown in Figure 2 by the spring 25, but against the damping action of the oil in the cylinder 15. The rear wheels are of course of a sufficient diameter to be able to ride up onto the obstruction 31 simply under the action of the motors. In order that the strut 18 can be put into an idle position in which it is out of the way of the footrest 8, to facilitate manoeuvring in level, but cramped, conditions, it can be swung clockwise from the ready position shown in Figure 2 into an idle position 18' indicated in dot-dash lines in Figure 2. In this condition of the device 9, the hook-shaped zone 21 is hooked over and bears against the bush 32, as indicated at 21', in which condition the axis A has been displaced in a vertical plane and through the horizontal axis of the axle 17, so that the spring 25 is applying to the strut 18 a clockwise moment, which moment is significantly greater than the anti-clockwise moment produced by the weight of the strut in its position 18'. The strut 18 is thereby maintained in that position until it is desired to return it anti-clockwise to its ready position, which the occupant can initiate by simply pressing the strut 18 downwards through the dead-centre position. That end of the spring 25 adjacent the bush 27 remains in contact therewith throughout movement of the piston rod 20 relative to the cylinder 15.

The connection of the upper end of the piston rod 20 to the bush 32 by way of the nut-and-bolt device 33 allows the piston rod 20 to be disconnected from the bush 32 and rotated about the axis A. Such rotation is required to adjust the compression in the spring 25 for a given length of the device 15, 16, so as to permit angular setting of the ready position of the strut 18. Rotation of the piston rod 20 achieves such adjustment because it screws the bush 27 along the piston rod 20, the bush 27 being held against rotation with the piston rod 20 by the frictional forces between the ends of the spring 25 and the frusto-conical bearing surfaces 24 and 28 of the bushes 23 and 27.

#### Claims

1. A wheeled vehicle, at least one wheel (4) of

5 which has associated therewith a device (9) for facilitating negotiation by said wheel (4) of a kerb or similar obstruction (31), said device (9) comprising a strut (18) mounted on the vehicle (1) for turning about a horizontal axis higher than the axis of the wheel (4), characterised in that said device (9) comprises a liquid damping means (15, 16) arranged to damp said turning movement in a ready position of said strut (18).

10 2. A vehicle according to claim 1, wherein said liquid damping means (15, 16) comprises a cylinder (15) containing the damping liquid, a piston head (29, 30) in said cylinder, a piston rod (20) connected to said piston head (29, 30), aperture means whereby said liquid can flow from one axial side of said piston head (29, 30) to the other in a throttled manner, and a return spring (25) arranged to return said strut (18) to said ready position after said strut (18) has rocked on said obstruction (31).

15 3. A vehicle according to claim 2, wherein said return spring (25) extends between said piston head (29, 30) and one end of said cylinder (15) and encircles said piston rod (20), which is connected to an end portion of said spring (25) which remains in a substantially fixed position relative to said rod (20) throughout movement of said strut (18).

20 4. A vehicle according to claim 2, wherein said return spring (25) extends between said piston head (29, 30) and one end of said cylinder (15) and encircles said piston rod (20), and there is on said piston rod (20) an abutment (27) bearing one end of said spring (25) and arranged to move longitudinally with the piston (16), said piston (16) and said cylinder (15) being turnable relative to each other about the axis of the cylinder (15) to adjust said abutment (27) along said piston rod (20) thereby to adjust said one end of said spring (25) along said piston rod (20).

25 5. A vehicle according to claim 4, wherein said abutment (27) has means (28) serving to discourage rotation of said abutment (27) relative to said piston rod (20) about said piston rod (20), and wherein the other end of said spring (25) bears on said cylinder (15) by way of means (24) serving to discourage rotation of said spring (25) relative to said cylinder (15).

30 6. A vehicle according to claim 5, wherein each said means (24, 28) serving to discourage rotation comprises a frusto-conical bearing surface (24, 28) facing said spring (25) and substantially coaxial with said piston rod (20).

35 7. A vehicle according to any preceding claim wherein said strut (18) is turnable from said ready position, in which said spring (25) applies a moment to said strut (18) in one sense round said axis, into an idle position (18'), in which said spring (25) applies a moment to said strut (18) in the opposite sense and stop means (21, 32) detains said strut (18) in said idle position (18').

40 8. A vehicle according to claim 7, wherein said cylinder (15) is mounted for turning about a transverse horizontal axis remote from the outer end (21) of said piston rod (20), and said stop

means (21, 32) comprises a stop (32) arranged on the axis of turning of said strut (18), and a hook-form part (21) of said piston rod (20) outside said cylinder (15) and arranged to hook about and bear against said stop (32) in said idle position (18') of said strut (18).

9. A vehicle according to claim 8, wherein said stop (32) is fixed to said strut (18) and pivotally mounts the outer end (21) of said piston rod (20).

10. A vehicle according to any preceding claim, and including a frame (6) and an attachment (7) detachably mounted on said frame (6), said attachment (7) comprising said device (9) and a rest (8) for a foot or a leg of an occupant of the vehicle (1).

11. An attachment for detachably mounting on a frame of a wheeled vehicle, said attachment (7) comprising a rest (8) for a foot or a leg of an occupant of the vehicle (1), characterised in that said attachment (7) also comprises a device (9) for association with a wheel (4) of said vehicle (1) for facilitating negotiation by said wheel (4) of a kerb or similar obstruction (31), said device comprising a strut (18) mounted for turning about an axis which is horizontal when said attachment is mounted on said frame of said wheeled vehicle, and liquid damping means (15, 16) arranged to damp the turning movement of said strut (18).

#### Patentansprüche

1. Fahrzeug mit Rädern, bei dem wenigstens einem Rad (4) eine Vorrichtung (9) zur Erleichterung der Überwindung einer Bordkante oder eines ähnlichen Hindernisses (31) durch dieses Rad (4) zugeordnet ist, wobei die genannte Vorrichtung (9) eine Strebe (18) enthält, die um eine horizontale Achse, welche höher liegt als die Achse des Rads (4), drehbar am Fahrzeug (1) angebracht ist, dadurch gekennzeichnet, daß die genannte Vorrichtung (9) eine Flüssigkeitsdämpfungseinrichtung (15, 16) enthält, um die Schwenkbewegung der Strebe (18) in einer einsatzbereiten Position der genannten Strebe (18) zu dämpfen.

2. Fahrzeug nach Anspruch 1, wobei die Flüssigkeitsdämpfungseinrichtung (15, 16) einen Zylinder (15) mit der Dämpfungsflüssigkeit, einen Kolbenkopf (29, 30) in dem genannten Zylinder, eine mit dem genannten Kolbenkopf (29, 30) verbundene Kolbenstange (20), Durchströmeinrichtungen anhand der die genannte Flüssigkeit von einer axialen Seite des genannten Kolbenkopfes (29, 30) zur anderen in gedrosselter Weise strömen kann, sowie eine Rückstellfeder (25) aufweist, die so angeordnet ist, daß die genannte Strebe (18) in die genannte einsatzbereite Position zurückkehrt, nachdem die genannte Strebe (18) an dem genannten Hindernis (31) eine Schwenkbewegung ausgeführt hat.

3. Fahrzeug nach Anspruch 2, wobei sich die genannte Rückstellfeder (25) zwischen dem genannten Kolbenkopf (29, 30) und einem Ende des genannten Zylinders (15) erstreckt und die genannte Kolbenstange (20) umgibt, die mit

einem Endbereich der genannten Feder (25) verbunden ist, die während der ganzen Bewegung der genannten Strebe (18) in einer im wesentlichen fixen Position relativ zur genannten Kolbenstange (20) verbleibt.

4. Fahrzeug nach Anspruch 2, wobei sich die genannte Rückstellfeder (25) zwischen dem genannten Kolbenkopf (29, 30) und einem Ende des genannten Zylinders (15) erstreckt und die genannte Kolbenstange (20) umgibt, und dabei ist auf der genannten Kolbenstange (20) ein Widerlager (27) vorgesehen, das ein Ende der genannten Feder (25) abstützt und so angeordnet ist, daß es sich mit dem Kolben (60) in Längsrichtung bewegt, wobei der genannte Kolben (16) und der genannte Zylinder (15) relativ zueinander um die Achse des Zylinders (15) drehbar sind, um das genannte Widerlager (27) entlang der genannten Kolbenstange (20) einzustellen und dementsprechend das eine Ende der genannten Feder (25) entlang der genannten Kolbenstange (20) einzustellen.

5. Fahrzeug nach Anspruch 4, wobei das genannte Widerlager (27) Mittel (28) zum Verhindern einer Drehung des genannten Widerlagers (27) relativ zu der genannten Kolbenstange (20) aufweist und wobei das andere Ende der genannten Feder (25) unter Verwendung von Mitteln (24), die dazu dienen, eine Drehung der genannten Feder (25) relativ zum genannten Zylinder (15) zu verhindern, am genannten Zylinder (15) abgestützt ist.

6. Fahrzeug nach Anspruch 5, wobei jedes der genannten Mittel (24, 28) zur Verhinderung einer Drehung eine kegelstumpfförmige Lagerfläche (24, 28) aufweist, welche die genannte Feder (25) berührt und im wesentlichen koaxial zur genannten Kolbenstange (20) verläuft.

7. Fahrzeug nach einem der vorhergehenden Ansprüche, wobei die genannte Strebe (18) von der genannten einsatzbereiten Stellung, in welcher die genannte Feder (25) ein Moment in der einen Richtung um die genannte Achse auf die genannte Strebe (18) ausübt, in eine Schwenkstellung (18'), in welcher die genannte Feder (25) ein Moment in der entgegengesetzten Richtung auf die genannte Strebe (18) ausübt, schwenkbar ist, und wobei Anschlagmittel (21, 32) die genannte Strebe (18) in der Schwenkstellung (18') aufhalten.

8. Fahrzeug nach Anspruch 7, wobei der genannte Zylinder (15) um eine quer verlaufende, horizontale Achse, die vom äußeren Ende (21) der genannten Kolbenstange (20) entfernt ist, drehbar ist, und wobei die Anschlagmittel (21, 32) einen auf der Drehachse der genannten Strebe (18) angeordneten Anschlag (32) und einen hakenförmigen Bereich (21) der genannten Kolbenstange (20) enthalten, der sich außerhalb des genannten Zylinders (15) befindet und so angeordnet ist, daß er den genannten Anschlag (32) in der genannten Schwenkstellung (18') der genannten Strebe (18) übergreift und hieran anliegt.

9. Fahrzeug nach Anspruch 8, wobei der genannte Anschlag (32) an der genannten Strebe

(18) befestigt ist und das äußere Ende (21) der genannten Kolbenstange (20) schwenkbar trägt.

10. Fahrzeug nach einem der vorhergehenden Ansprüche und mit einem Rahmen (6) und einer Zusatzeinrichtung (7), die abnehmbar an dem genannten Rahmen (7) gehalten ist, wobei die genannte Zusatzeinrichtung (7) die genannte Vorrichtung (9) und eine Stütze (8) für einen Fuß oder ein Bein des Benutzers des Fahrzeugs (1) enthält.

11. Anbaueinrichtung, die abnehmbar am Rahmen eines mit Rädern versehenen Fahrzeugs aufnehmbar ist und die eine Stütze (8) für einen Fuß oder ein Bein des Benutzers des Fahrzeugs (8) enthält, dadurch gekennzeichnet, daß die genannte Anbauvorrichtung (7) auch eine mit einem Rad (4) des genannten Fahrzeugs (1) zusammenwirkende Vorrichtung (9) zur Erleichterung der Überwindung der einer Bordkante oder eines ähnlichen Hindernisses (31) enthält, wobei die genannte Vorrichtung eine Strebe (18) enthält, die um eine in der an den genannten Rahmen des genannten, mit Rädern versehenen Fahrzeugs angebauten Stellung der Anbaueinrichtung horizontale Achse drehbar ist, und daß die Anbaueinrichtung (7) ferner eine Flüssigkeitsdämpfuneinrichtung (15, 16) enthält, um die Schwenkbewegung der genannten Strebe (18) zu dämpfen.

#### Revendications

1. Véhicule roulant, dont à au moins une roue (4) est associé un dispositif (9) destiné à faciliter une négociation par ladite roue (4) d'une bordure de trottoir ou d'un obstacle similaire (31), ce dispositif (9) comprenant une jambe (18) montée sur le véhicule (1) pour tourner autour d'un axe horizontal situé plus haut que l'axe de la roue (4), caractérisé en ce que le dispositif (9) comprend un moyen amortisseur (15, 16) à liquide agencé de manière à amortir ledit mouvement de rotation dans une position prête à fonctionner de ladite jambe (18).

2. Véhicule selon la revendication 1, dans lequel ledit moyen amortisseur (15, 16) à liquide comprend un cylindre (15) contenant le liquide amortisseur, une tête (29, 30) de piston dans ledit cylindre, une tige (20) de piston reliée à ladite tête (29, 30) de piston, un moyen formant ouverture grâce auquel le liquide peut s'écouler d'un des côtés axiaux de ladite tête (29, 30) de piston jusqu'à l'autre côté d'une manière étranglée, et un ressort (25) de rappel disposé de manière à rappeler ladite jambe (18) jusqu'à ladite position prête à fonctionner après que la jambe (18) a basculé sur ledit obstacle (31).

3. Véhicule selon la revendication 2, dans lequel le ressort (25) de rappel s'étend entre la tête (29, 30) de piston et une des extrémités du cylindre (15) et entoure la tige (20) de piston qui est reliée à une partie terminale du ressort (25) lequel reste dans une position sensiblement fixe par rapport à la tige (20) pendant tout le déplacement de la jambe (18).

4. Véhicule selon la revendication 2, dans lequel le ressort (25) de rappel s'étend entre la tête (29,

30) de piston et une des extrémités du cylindre (15) et entoure la tige (20) de piston, et sur la tige (20) de piston se trouve un élément de butée (27) portant contre une première extrémité du ressort (25) et agencé de manière à se déplacer longitudinalement avec le piston (16), le piston (16) et le cylindre (15) pouvant être déplacés en rotation l'un par rapport à l'autre autour de l'axe du cylindre (15) pour ajuster ledit élément de butée (27) le long de la tige (20) de piston, de manière à ajuster ainsi ladite première extrémité du ressort (25) le long de la tige (20) de piston.

5. Véhicule selon la revendication 4, dans lequel l'élément de butée (27) comporte un moyen (28) servant à s'opposer à la rotation de l'élément de butée (27) par rapport à la tige (20) de piston autour de cette tige (20) de piston, et dans lequel la seconde extrémité du ressort (25) porte contre le cylindre (15) par l'intermédiaire d'un moyen (24) servant à s'opposer à la rotation du ressort (25) par rapport au cylindre (15).

6. Véhicule selon la revendication 5, dans lequel chacun des moyens (24, 28) servant à s'opposer à la rotation comprend une surface de portée tronconique (24, 28) qui se trouve en regard du ressort (25) et est sensiblement coaxiale à la tige (20) de piston.

7. Véhicule selon l'une quelconque des revendications précédentes, dans lequel la jambe (18) peut pivoter depuis ladite position prête à fonctionner, dans laquelle le ressort (25) applique un moment à la jambe (18) dans un premier sens autour dudit axe, jusqu'à une position de repos (18') dans laquelle le ressort (25) applique un moment à la jambe (18) en sens opposé et un moyen de butée (21, 32) retient la jambe (18) dans la position de repos (18').

8. Véhicule selon la revendication 7, dans lequel le cylindre (15) est monté en vue de tourner autour d'un axe horizontal transversal, distant de l'extrémité extérieure (21) de la tige (20) de piston, et le moyen d'arrêt (21, 32) comprend une butée (32) disposée sur l'axe de rotation de ladite jambe (18), et une partie (21) en forme de crochet de la tige (20) de piston à l'extérieur du cylindre (15) et agencée de manière à accrocher la butée (32) et à porter contre cette butée dans la position de repos (18') de la jambe (18).

9. Véhicule selon la revendication 8, dans lequel la butée (32) est fixée à la jambe (18) et supporte de façon pivotante l'extrémité extérieure (21) de la tige (20) de piston.

10. Véhicule selon l'une quelconque des revendications précédentes, et comprenant un bâti (6) et un agencement auxiliaire (7) monté de façon amovible sur la bâti (6), ledit agencement auxiliaire (7) comprenant le dispositif (9) et un repose pied (8) pour un pied ou une jambe d'un occupant du véhicule (1).

11. Agencement auxiliaire destiné à être monté de façon amovible sur un bâti d'un véhicule roulant, cet agencement auxiliaire (7) comprenant un repose pied (8) pour un pied ou une jambe d'un occupant d'un véhicule (1), caractérisé en ce que l'agencement auxiliaire (7) comprend aussi

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un dispositif (9) destiné à être associé à une roue (4) du véhicule (1) pour faciliter la négociation par ladite roue (4) d'une bordure de trottoir ou d'un obstacle similaire (31), le dispositif précité comprenant une jambe (18) montée en vue d'une

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rotation autour d'un axe qui est horizontal lorsque l'agencement auxiliaire est monté sur le bâti du véhicule roulant, et un moyen amortisseur (15,16) à liquide agencé de manière à amortir ou freiner le mouvement de rotation de la jambe (18).

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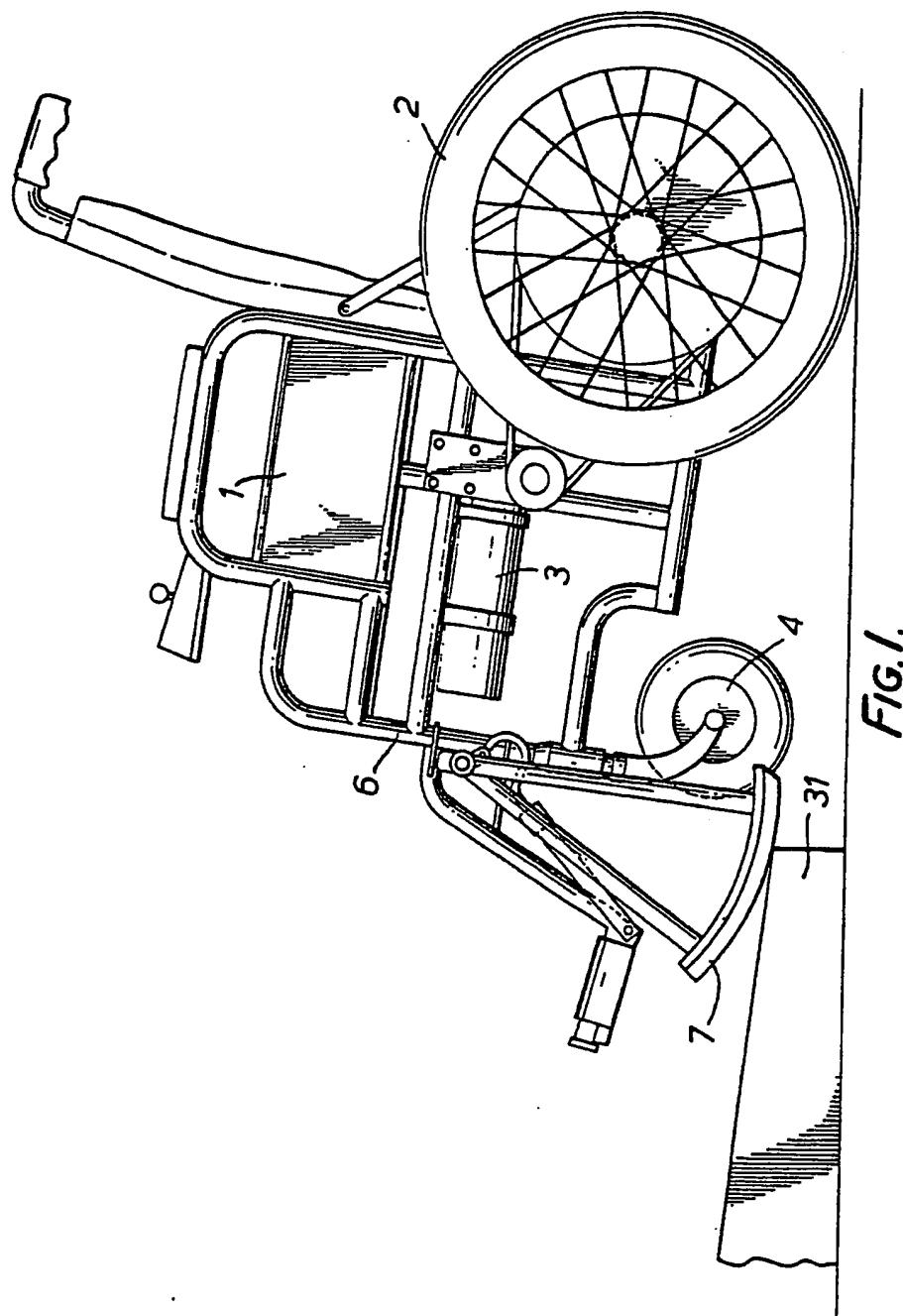
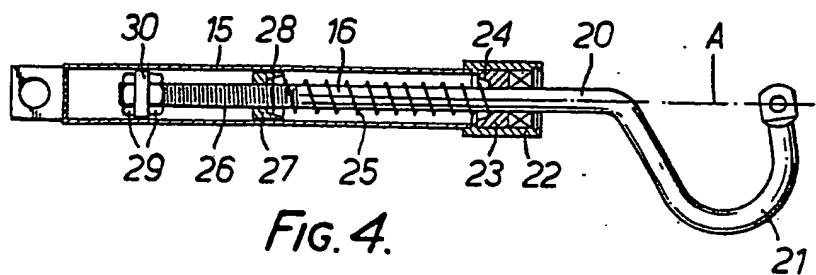
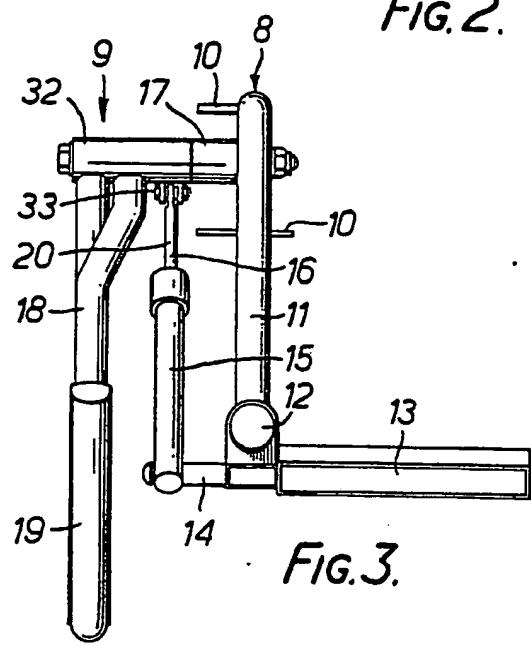
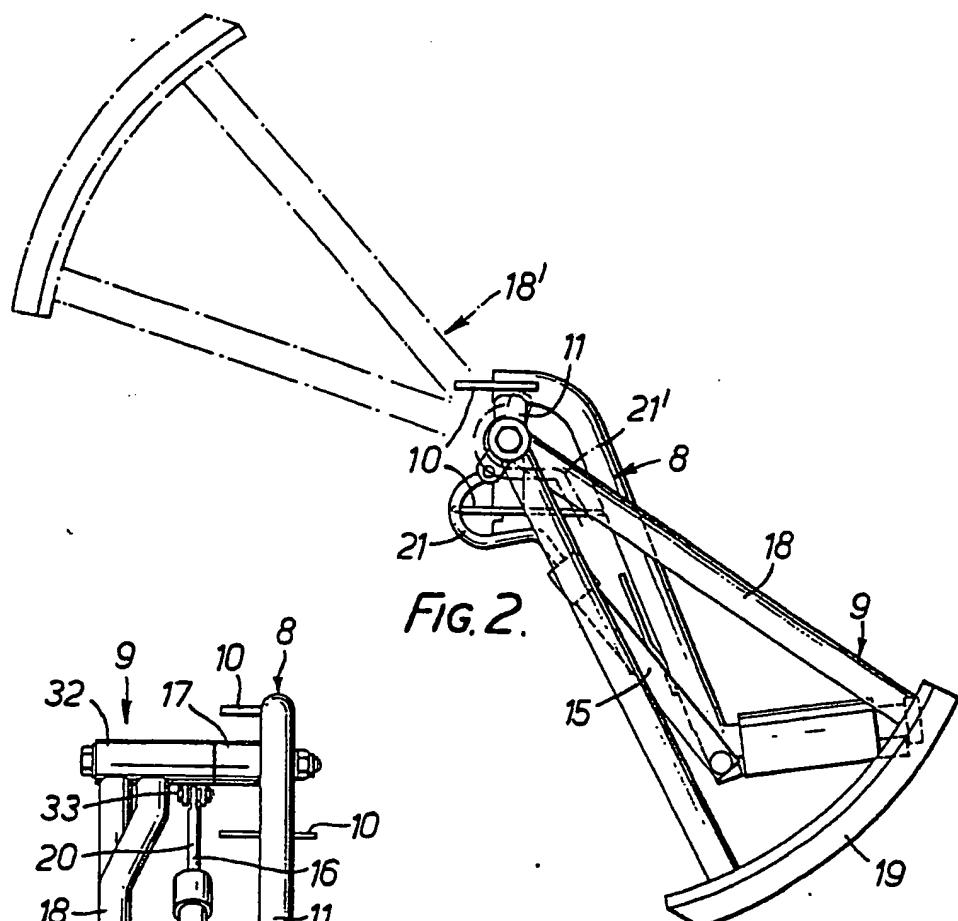


FIG. I.

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